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ABSTRACT

Research investigated the aptitude-treatment interaction (ATI) effects of sex and ability of subjects grouped in dyads to play the simulation game Life Career. The dependent variable was career maturity and it was hypothesized that role-taking would be an intervening variable. A blocked factorial design was employed with 576 students from grade 11 sorted into 48 dyads. Post-game test results from the Career Maturity Inventory (CMI) and from two experimenter-designed questionnaires showed that there were no differences in the dependent variable of career maturity due to treatment, treatment levels, or ATI; only unreliable differences were found on the intervening variable. Since the sampling, experimental design, and treatment appeared valid, further research focusing on the dependent and independent variables suggests itself. The utility of the CMI and the experimental questionnaires should be examined. Research should investigate: 1) the interaction between the dependent and intervening variables; 2) the relation between different learning theories and the dependent variables; and 3) the construct of role-taking. (PB)

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INTERACTION EFFECTS OF SEX AND ABILITY OF GRADE ELEVEN PARTICIPANTS IN THE SIMULATION, LIFE CAREER, UPON ROLE-TAKING AND CAREER MATURITY

agnes Groome.

Problem

The widespread acceptance of simulation games, despite the lack of empirical evidence of their effectiveness, gave rise to the present study. The problem was to assess the effects of participation in a simulation activity upon high school students.

Definitions and Hypotheses

The primary objective of this study was to investigate the aptitude-treatment interaction (ATI) effects of sex and ability of subjects (Ss) playing in dyads in the simulation, Life Career, upon the dependent variable, career maturity, and upon the hypothesized intervening variable, role-taking. Role-taking was assumed to be the participant's intervening response during the simulation activity and was defined operationally as the degree to which the subject was able to overcome personological differences between himself and the role which he took in Life Career. Career maturity was held to be synonymous with ability to deal with life career decisions as measured by Crites' (1973a) Career Maturity Inventory (CMI). It was expected that congruencies of sex and ability in treatment levels of role and dyad levels would be correlated positively with the degree of role-taking and gains in career maturity, and incongruencies would be correlated negatively. Two principal hypotheses were being investigated:

1. There would be differences across treatment levels and dyad

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levels between experimental (E) and control (C) groups on the dependent variable, career maturity.

2. There would be differences across treatment levels and dyad levels of E on the intervening variable, role-taking.

Review of the Literature

In four reviews of research in ATI (Bracht, 1970; Cronbach and Snow, 1969; Mitchell, 1969; Salomon, 1972), the authors concluded that there were few reports of significant ATI effects, but urged that such studies be continued. Three studies specifically of ATI in role-taking supported the expectations of the hypotheses respecting congruency (Milton, 1957; Saroin and Allan, 1968; Smelser and Smelser, 1963).

Where simulations were used as treatment, Boone(1972) and Lee (1970) did find ATI effects on Environmental Concern and on Trust in People. When role and task variables were controlled, the ATI effects were inconclusive. Three studies used Schild's simulation, Parent-Child (Stoll, 1968; Stoll and McFarlane, 1969; Boocock, 1972b). In a business simulation, homogeneity in ability of simulation partners correlated positively with satisfaction and performance (McKenny and Dill, 1966). Congruence of ability but not of sex was significant in role enactment (Duke, 1972). For high- and low-anxiety subjects working alone or with a partner, there were ATI effects on role enactment (Sutter and Reid, 1969).

Studies of high school students' participation in Life Career have produced little positive evidence of effects on dependent variables. In the early studies by the designer of Life Career, Boocock (1966, 1967, 1968, 1972a) reported inconclusive findings from her experimenter-designed

tests to assess knowledge, attitude change, and sense of control. McHenry (1969) found significant gains in knowledge for grade eight ($p<.05$) but not for grade seven. Atkinson (1970) found no treatment effects on grade eleven subjects' sense of control. In two studies with small samples, Adams (1971) and Johnson (1970) did not find evidence of changes in decision-making. As for career maturity, neither Garner (1972) nor Mulherin (1971) found significant gains. On the other hand, when personological variables were taken into account some ATI effects have been observed (Atkinson, 1970; Farran, 1968; Johnson and Euler, 1972; Mulherin, 1971). However, there seemed to be no study of possible ATI effects of role-taking to which Boocock alluded (1967, p. 332).

The Research Procedures

The sample consisted of 576 grade eleven subjects from nine high schools in Regina, Saskatchewan, Canada. From the population of Ss blocked on sex and ability (high and low with average excluded), in each school a random selection of 16 students per block was drawn and assigned alternately to E and C.

To investigate ATI effects, a blocked factorial design was used. The four treatment levels were defined by the sex and ability (high and low) of the role assigned to the player in the simulation. The dyad levels were defined by sex and ability of team members. By sex, there were three (MM, FF, MF); within each sex level, there were four ability levels in the dyads (HH, HL, LH, LL). To obtain the 48 dyads needed to completely cross treatment and dyad levels, the nine schools were divided into three equivalent groups, representative geographically and socio-economically of the city. Within each school group, E (N=96 and C (N=96) were randomly assigned to dyads,

member A being chosen randomly from the block of 24 Ss in the three schools, and B being chosen randomly from the block of eight Ss in A's school. On the dependent variable, there were six main effects, treatment (T), school group (G) sex of role (Y), ability of role (I), sex of dyad (X), ability of dyad (A); on the intervening variable, there were five, G, Y, I, X, and A.

The instrument to measure the dependent variable, career maturity, was Crites' (1973) Career Maturity Inventory (CMI). The instrument to assess the intervening variable, role-taking, consisted of two experimenter-designed questionnaires, Successful Planning Questionnaire (SPQ) and Career Decision-Making Questionnaire (CDMQ). The complete questionnaires can be found in Appendix A.

The treatment consisted of participation in the simulation Life Career, for one school day. Rather than have an individual plan his own career, the format of the simulation provided four profiles or case histories of persons for whom dyads of players made career decisions. There were two male profiles (Bob and Mike) and two female ones (Mary and Anne) with high and low academic ability respectively for each sex. Each round of play in Life Career simulated one year of real life. All dyads completed at least four rounds of play. On each of three consecutive days, the treatment was administered in three schools by teams of three trained graduate students assisted by school counselors. During treatment, E answered SPQ; immediately after treatment, they answered CDMQ. On the morning following treatment, all grade eleven students in those schools completed Crites' CMI in a two-hour block of time.

The data consisted of the scores of E and C on the five parts of the Competence Test, on the Competence Test, on the Attitude Scale,

and on the total test of Crites' CMI for the dependent variable. The data for the intervening variable, role-taking, and its seven components were calculated from the responses of E on SPQ and CDMQ. Specifically, the subtest scores for role-taking were computed in the following ways. Role-taking satisfaction scores were the totals of the responses of S on a five-point scale for the first four rounds of play in the treatment. Role-taking involvement scores were the products of the scale values selected by S for degree of involvement (item two) and proportion of time of involvement (item three). Role-taking consensus scores were the sums of the scale values of item five and item six reversed. A role-clarity score was the sum of item nine and item ten reversed (that is, a scale value of 5 was recorded if item ten was left blank and a value of 1 if all five spaces were completed). The response of S on item seven constituted the score on intrarole agreement. The single response in item thirteen was used as the score on transfer awareness. For self-role congruence, the test score was the total number of factors in item eleven which were checked as "alike". For role-taking, S's score was the difference between the number of factors checked as "yes" in item twelve minus S's self-role congruence score. In all, there were eight subtests of role-taking dimensions.

The Analysis of the Data

Reliability and Validity of the Measuring Instruments

The Dependability of the Instrument for the Dependent Variable. To evaluate the reliability and validity of the measuring instruments for the designated purposes in this study, the following statistical procedures were used. The responses of Ss (N = 576) on Crites' CMI were sub-

jected to an item analysis based upon Hoyt's estimate of internal consistency of items with total test scores. Because the five parts of the Competence Test of CMI with twenty items in each had observed reliability coefficients ranging from .38 to .69, interpretations of any observed differences on any one of them would have to take into account the reliability of the measure. For a 50-item scale, the observed reliability of the Attitude Scale (.66 and .72) for a sample of 288 was considered to be a modest one. The reliabilities for the Competence Test (.85) and for the total test scores of CMI (.85 and .86) were indicative of good reliability.

The Dependability of the Instruments for the Intervening Variable. Two separate analyses of the data for the intervening variable were made to estimate the effectiveness of the instruments. First, the responses of Ss were used to obtain an intercorrelation matrix of the four items of SPQ and the 36 responses on CDMQ. The correlation coefficients (out of a possible 800) which were observed as significant were 58 ($p<.05$) or 36 ($p<.01$). Reducing these observations by the numbers expected due to chance (40 and 8 respectively), there were only 18 significant coefficients of correlation ($p<.05$), or 28 ($p<.01$).

The small number of significant coefficients did not present the total picture of the nature of the instruments for the purposes of the experiment. They were designed as multifactor tests, and it was assumed that heterogeneity could provide increased opportunities for raising the validity and reliability of the instruments without an unduly large number of items (Magnusson, 1966, pp. 189-193). A factor analysis by oblique rotation developed by Tryon and Bailey (1970) was used to determine the communality of the instruments and the item clusters within them.

TABLE 1

MEANS, STANDARD DEVIATIONS, AND RELIABILITY COEFFICIENTS OF DEPENDENT VARIABLES FOR THE EXPERIMENTAL (N = 288) AND CONTROL (N = 288) GROUPS

Crites' Career Maturity Inventory	Experimental Group			Control Group		
	$\bar{X}$	s	r_{xx}	$\bar{X}$	s	r_{xx}*
CMI Attitude Scale	36.47	4.73	.66	36.19	5.20	.72
CMI Competence Test	72.59	9.77	.85	73.52	9.77	.85
Knowing Yourself	14.28	2.73	.55	14.66	2.65	.54
Knowing About Jobs	17.30	2.50	.69	17.41	2.26	.63
Choosing a Job	14.34	2.81	.59	14.61	2.69	.58
Looking Ahead	14.78	3.08	.67	14.79	3.06	.66
What Should They Do?	11.89	2.55	.38	12.05	2.85	.50
CMI Total Test	109.05	12.44	.85	109.71	12.08	.86

*r_{xx} is Hoyt's Internal Consistency Estimate calculated by the Laboratory of Educational Research Test Analysis Program (LERTAP), the Laboratory of Educational Research, University of Colorado, Boulder, Colorado.

In Table 2, the summary of the factor analysis is presented. It includes the definers and non-definers in the clusters of each factor, the reliability coefficients of the cluster score on the full set of defining variables, the lower bound of the factor coefficient that maximizes the cumulative reliability of the expanded cluster score for definers plus non-definers, the proportion of the estimated communality due to that factor, and the proportion of the mean square of the raw score correlation for each cluster.

In the factor analysis, the initial estimation of the sum of communalities in the instruments was only 13.43. It was evident that the instruments to measure the intervening variable were not reliable. In Cluster 2 were the subtests for role-taking involvement, role-taking consensus, intrarole agreement, and transfer awareness. In Clusters 1, 3, 4, 5, 6, 7, were the items used to compute self-role congruence and role-taking. The items to measure role-taking satisfaction and role clarity did not appear in the clusters. Clearly, the factor analysis provided very minimal support for the computations of subtest scores on the intervening variable which had been planned for the experiment.

It had been expected that the scores of the dependent and intervening variables would correlate with one another in predicted directions. Therefore, a matrix of correlation coefficients of the eight measures of the dependent variable and nine measures of the intervening variable was obtained. The matrix is displayed in Table 3. It can be seen that the subtests and total test scores of Crites' CMI were significantly intercorrelated and were measuring a common factor, career maturity. The lack of significance for the coefficients on the subtests of the intervening variable indicate little in common with one another.

TABLE 2

CLUSTER ANALYSIS OF THE SUCCESSFUL PLANNING QUESTIONNAIRE AND CAREER DECISION-MAKING QUESTIONNAIRE BASED ON CORRELATIONS AMONG RAW SCORES, SHOWING ITEMS IN THE CLUSTERS, THE RELIABILITY COEFFICIENTS OF THE CLUSTER SCORE ON THE FULL SET OF DEFINING VARIABLES (R_A), THE LOWER BOUND OF THE FACTOR COEFFICIENT THAT MAXIMIZES THE CUMULATIVE RELIABILITY OF THE EXPANDED CLUSTER SCORE FOR DEFINERS PLUS NON-DEFINERS (R_{LB}), THE PROPORTION OF THE ESTIMATED COMMUNALITY, AND THE PROPORTION OF THE MEAN SQUARE OF THE RAW SCORE CORRELATION OF THE CLUSTER

Cluster	Items			r_A	r_{LB}	h^2	MS
	Definers	Non-definers					
1	38* 28 26 36			.73	.41	.15	.20
2	11* 12 39 14	16 4		.69	.38	.16	.19
3	25* 23 33	35 20		.66	.41	.13	.18
4	21* 10	31		.42	.29	.10	.14
5	34* 23 30	24		.53	.32	.11	.05
6	27* 37			.58	.40	.06	.03
7	22* 32			.55	.37	.07	.01
	Total					.78	.08

* pivotal variable

TABLE 3

INTERCORRELATION MATRIX OF INTERVENING VARIABLES AND DEPENDENT VARIABLES FOR EXPERIMENTAL (N = 288) GROUP

Variable	1	2	3	4	5
1 Role-taking Satisfaction	1.00	+.11	+.20*	+.07	+.16
2 Role-taking Involvement		1.00	+.34**	+.10	+.26**
3 Role-taking Consensus			1.00	+.08	+.44**
4 Role Clarity				1.00	+.09
5 Intrarole Agreement					1.00
6 Transfer Awareness					
7 Self-role Congruence					
8 Role-taking					
9 CMI Attitude Scale					
10 CMI Comp. Part 1					
11 CMI Comp. Part 2					
12 CMI Comp. Part 3					
13 CMI Comp. Part 4					
14 CMI Comp. Part 5					
15 CMI Comp. Test Total					
16 CMI Test Total					

TABLE 3 (continued)

Variable	6	7	8	9	10	11
1	+.07	+.11	+.03	-.09	-.13	-.09
2	+.40**	+.11	+.00	+.00	+.10	-.00
3	+.30**	+.04	-.05	-.06	-.08	-.13
4	+.12	-.02	+.01	-.13	-.05	-.06
5	+.17	+.06	-.02	+.02	+.00	-.07
6	1.00	+.04	-.06	-.08	-.11	-.11
7		1.00	-.45**	+.18	-.05	+.01
8			1.00	+.27**	+.17	+.08
9				1.00	+.39**	+.27**
10					1.00	+.38**
11						1.00
12						
13						
14						
15						
16						

TABLE 3 (continued)

Variable	12	13	14	15	16
1	-.02	-.08	+.01	-.09	-.10
2	-.00	+.08	+.07	+.07	+.06
3	-.12	+.02	-.07	-.10	-.10
4	-.15	-.09	+.02	-.09	-.12
5	-.02	-.01	+.06	-.01	+.00
6	-.07	-.12	-.03	-.12	-.13
7	-.03	+.07	-.01	+.00	-.07
8	+.09	+.06	+.08	+.13	+.21*
9	+.29**	+.23*	+.26**	+.40**	+.39**
10	+.42**	+.38**	+.38**	+.71**	+.71**
11	+.52**	+.48**	+.20*	+.72**	+.66**
12	1.00	+.45**	+.32**	+.76**	+.71**
13		1.00	+.33**	+.76**	+.68**
14			1.00	+.61**	+.58**
15				1.00	+.94**
16					1.00

*p<.05, r .195 (N = 100)

**p<.01, r .254 (N = 100)

Further, the lack of significant correlation between the dependent and intervening variables did not support the predictions of the study.

The Statistical Findings of the Study

The analysis of the data was done in two stages. In the first stage, the data were analyzed using the original factorial design and six fixed effects (T, G, Y, I, X, A) for the dependent variable, and five main effects (G, Y, I, X, A) for the intervening variable. In the second stage, the design was collapsed on the G effect in such a manner that X (Sex of Dyad) became the second effect for the dependent variable (T, X, P, A) and the first effect of the intervening variable (X, P, A). The Y and I effects (2X2) were changed to four levels of P (Profile Person). To test for significance of differences between sets of means, the Newman-Keuls method was employed.

The Analysis of the Data of the Dependent Variable. The summaries of degrees of freedom from error and F-ratios from the testing of the scores of the Ss on CMI with a factorial design and fixed effects analysis of variance for six main effects and one significant interaction are set out in Table 4 and for the collapsed design of five main effects in Table 5.

On the dependent variable, the analyses yielded no significant F-ratios for the main effects, T, G, Y, or I. There were no significant F-ratios for ATI effects. There were significant differences in favor of the girls on CMI total test scores, the Competence Test, and Parts 1 and 5 of it ($p<.01$), and on Part 4 ($p<.05$). There were significant differences ($p<.01$) in favor of the high-ability Ss on all eight test scores of Crites' CMI.

TABLE 4

SUMMARY OF ANALYSIS OF VARIANCE F VALUES FOR DEPENDENT VARIABLE, CAREER MATURITY, AS MEASURED BY CRITES CAREER MATURITY INVENTORY, SHOWING F VALUES FOR ATTITUDE SCALE; COMPETENCE TEST, PARTS 1, 2, 3, 4, and 5, COMPETENCE TEST TOTAL SCORES; AND CAREER MATURITY INVENTORY TOTAL SCORES FOR EXPERIMENTAL AND CONTROL

Source of Variation	df	F Values							
		Attitude Scale	Comp. Part 1	Comp. Part 2	Comp. Part 3	Comp. Part 4	Comp. Part 5	Comp. Test total	CMI Test Total
Main Effects									
Treatment (T)	1	.42	2.60	.30	1.33	.00	.49	1.24	.36
School Group (G)	2	1.87	.34	1.34	.05	.25	1.08	.46	.75
Sex of Role (Y)	1	.25	.03	2.21	.21	.51	.03	.11	.19
Ability of Role (I)	1	.01	2.06	.58	.37	.01	.06	.20	.14
Sex of Dyad (X)	2	1.18	9.81**	.58	1.70	3.39*	7.71**	7.06**	5.85**
Ability of Dyad (A)	3	5.11**	5.60**	20.54**	8.65**	14.25**	5.07**	17.23**	16.14**
Interactions									
.									
.									
.									
GIX	4	1.92	.53	3.06*	1.32	.65	.80	1.08	.12
.									
.									

*$p < .05$, $F(1,200) = 3.89$; $F(2,200) = 3.04$; $F(3,200) = 2.65$; $F(4,200) = 2.42$; $F(6,200) = 2.14$; $F(12,200) = 1.80$

**$p < .01$, $F(1,200) = 6.76$; $F(2,200) = 4.71$; $F(3,200) = 3.88$; $F(4,200) = 3.41$; $F(6,200) = 2.89$; $F(12,200) = 2.27$

TABLE 5

SUMMARY OF ANALYSIS OF VARIANCE F VALUES FOR DEPENDENT VARIABLE, CAREER MATURITY, AS MEASURED BY CRITES' CAREER MATURITY INVENTORY, SHOWING F VALUES FOR ATTITUDE SCALE; COMPETENCE TEST, PARTS 1, 2, 3, 4, and 5, COMPETENCE TEST TOTAL SCORES; AND CAREER MATURITY INVENTORY TOTAL SCORES FOR EXPERIMENTAL AND CONTROL

Source of Variation	df	F Values							
		Attitude Scale	Comp. Part 1	Comp. Part 2	Comp. Part 3	Comp. Part 4	Comp. Part 5	Comp. Test Total	CMI Test Total
Main Effects									
Treatment (T)	1	.47	3.32	.34	1.74	.00	.55	1.80	.55
Sex of Dyad (X)	2	1.32	12.53**	.66	2.22	4.02*	8.58**	10.25**	8.99**
Profile Person (P)	3	.25	1.33	1.26	.40	.34	.06	.40	.50
Ability Within Dyad (A)	3	20.82**	23.52**	38.43**	36.66**	36.47**	16.13**	64.48**	69.10**
Interactions									
TX	2	1.58	1.62	.76	.04	2.50	.48	.82	1.48
TP	3	.13	.06	.98	1.00	.78	1.05	.44	.44
TA	3	.44	.41	.87	1.13	1.75	.55	.84	.23
XP	6	.50	.52	1.30	1.21	1.46	1.64	1.07	.72
XA	6	.43	1.43	1.84	1.15	1.48	.14	1.29	1.05
PA	9	.62	1.02	1.03	1.78	.33	1.08	1.17	1.04
TXP	6	1.17	1.33	1.02	.80	1.34	.55	1.23	1.73
TXA	6	.65	.59	1.29	1.20	.54	.66	.86	.67
TPA	9	.74	.47	1.37	.66	.92	.53	.78	.86
XPA	18	.59	1.20	.52	.76	1.34	1.45	.93	.93
TXPA	18	1.53	1.42	1.63	1.05	.85	.93	1.37	1.78*
S(TXPA)	480								

The Analyses of the Data of the Intervening Variable, Role-taking. The scores of E on SPQ and on the subtests of CDMQ were also tested with a factorial design and fixed effects analysis of variance for five main effects, G, Y, I, X, A, and for three main effects, X, P, A. The summaries of degrees of freedom from error and F-ratios for the seven subtest scores of these analyses are presented in Tables 6 and 7 respectively.

In the first analysis of these data, on three of the seven subtests (role-taking satisfaction, role-taking involvement, role-taking consensus), F-ratios for School Group (G) were significant ($p<.01$), so that the F-values of those three variables were confounded with the G-effect on the second analysis. The results of the second analysis were used, therefore, for only the remaining four subtests. In three of them, the F-ratio of the P effect was significant. In role clarity in the multiple-comparison test, the mean differences were not significant. For self-role congruence and for role-taking, the P effect was significant ($p<.01$). In the former, it was found that $P_1 > P_4$ ($p<.05$); $P_3 > P_4$ ($p<.01$); $P_2 > P_4$ ($p<.01$) and $P_2 > P_1$ ($p<.05$). Players of all three other roles had significantly higher mean scores than players of Anne. Players of Mike had significantly higher mean scores than players of Anne and Bob. On role-taking, it was found that $P_4 > P_3$ ($p<.01$); $P_4 > P_1$ and P_2 ($p<.05$). Players of Anne had higher mean scores on role-taking than players of Mary, Bob, or Mike. In the main effect, A, it was found that $S_{HH} > S_{LL}$ ($p<.01$) and that $S_{HH} > S_{LH}$ ($p<.05$). High-ability Ss playing with high-ability Ss had higher mean scores on role-taking than low-ability Ss playing with either low- or high-ability team partners. There were three significant interactions, XP ($p<.01$) and XA ($p<.05$) in self-role

TABLE 6

SUMMARY OF ANALYSIS OF VARIANCE F VALUES FOR INTERVENING VARIABLE, ROLE-TAKING, AND ITS COMPONENTS, ROLE-TAKING SATISFACTION (RTS), ROLE-TAKING INVOLVEMENT (RTI), ROLE-TAKING CONSENSUS (RTC), ROLE CLARITY (RC), INTERROLE AGREEMENT (IA), SELF-ROLE CONGRUENCE (SRC), AND ROLE-TAKING (RT), AS MEASURED BY THE SUCCESSFUL PLANNING QUESTIONNAIRE AND THE CAREER DECISION MAKING QUESTIONNAIRE FOR THE EXPERIMENTAL (N = 288) GROUP

Source of Variation	df	F Values						
		RTS	RTI	RTC	RC	IA	SRC	RT
Main Effects								
School Group (G)	2	10.43**	7.98**	4.09*	2.67	.96	.59	.50
Sex of Role (Y)	1	42.62**	.47	.27	2.23	2.11	11.41**	.76
Ability of Role (I)	1	.34	3.57	.14	5.03*	.12	.74	9.18**
Sex of Dyad (X)	2	9.92**	1.17	.67	1.50	1.31	8.67**	7.51**
Ability of Dyad (A)	3	5.42**	2.76*	3.20*	1.83	2.63	.88	4.58**
Interactions								
GY	2	3.61*	2.95	1.70	.19	1.31	.25	.28
GI	2	3.09*	.46	.49	.61	.21	2.20	.69
GX	4	4.30**	.88	1.80	.37	.52	.41	1.51
GA	6	4.57**	1.26	.60	.59	1.22	2.46*	2.24*
YI	1	.34	.03	4.71*	1.17	.04	21.77**	5.91*
YX	2	7.36**	2.62	2.14	.74	3.55*	10.25**	1.87
YA	3	8.15**	.59	.91	.89	2.24	.17	1.17
IX	2	3.23*	1.35	2.66	1.55	3.16*	.14	.54
IA	3	6.96**	.64	.30	1.47	1.14	1.21	2.22

TABLE 6 (continued)

Source of Variation	df	F Values						
		RTS	RTI	RTC	RC	IA	SRC	RT
XA	6	2.52*	1.21	1.17	.90	1.98	2.20*	1.27
GYI	2	14.42**	1.26	1.27	4.26*	1.74	.20	.13
GYX	4	9.60**	.81	.11	1.32	.18	.69	2.76*
GYA	6	6.51**	1.50	.18	.83	1.09	1.06	1.32
GIX	4	6.70**	1.85	.48	.29	2.09	1.14	.61
GIA	6	3.67**	.96	1.05	.49	.77	1.05	1.91
GXA	12	5.24**	2.25*	1.99*	1.74	1.48	1.19	1.37
YIX	2	8.39**	.48	1.20	.05	3.46*	2.75	2.32
YIA	3	.95	.37	.68	.10	.99	2.45	1.25
YXA	6	5.32**	.85	1.25	1.18	.65	.94	2.75*
IXA	6	1.08	1.59	.41	.72	.56	1.89	.58
GYIX	4	2.46*	.13	.61	.39	.44	3.12*	.37
GYIA	6	2.58*	3.32**	.58	.37	2.57*	.72	.69
GYXA	12	5.50**	1.78	1.02	1.08	1.96*	1.96*	.57
GIXA	12	6.56**	1.28	1.00	1.89*	.98	.98	1.44
YIXA	6	7.17**	1.25	.22	1.30	2.26*	1.12	.55
GYIXA	12	5.58**	1.08	.85	1.45	1.62	.58	.61
S(GYIXA)	144							
Total	287							

*$p < .05$, $F(1,120) = 3.92$; $F(2,120) = 3.07$; $F(3,120) = 2.68$; $F(4,120) = 2.45$; $F(6,120) = 2.17$; $F(12,120) = 1.83$

**$p < .01$, $F(1,120) = 6.85$; $F(2,120) = 4.79$; $F(3,120) = 3.95$; $F(4,120) = 3.48$; $F(6,120) = 2.96$; $F(12,120) = 2.34$

TABLE 7

SUMMARY OF ANALYSIS OF VARIANCE F VALUES FOR INTERVENING VARIABLE, ROLE-TAKING, AND ITS COMPONENTS, ROLE-TAKING SATISFACTION (RTS), ROLE-TAKING INVOLVEMENT (RTI), ROLE-TAKING CONSENSUS (RTC), ROLE CLARITY (RC), INTRAROLE AGREEMENT (IA), SELF-ROLE CONGRUENCE (SRC), AND ROLE-TAKING (RT), AS MEASURED BY THE SUCCESSFUL PLANNING QUESTIONNAIRE AND THE CAREER DECISION MAKING QUESTIONNAIRE FOR THE EXPERIMENTAL (N = 288) GROUP

Source of Variation	df	F Values						
		RTS	RTI	RTC	RC	IA	SRC	RT
Main Effects								
Sex of Dyad (X)	2	3.48*	.90	.66	1.43	1.14	7.91**	7.10**
Profile Person (P)	3	5.07**	1.05	1.69	2.68*	.66	10.14**	4.99**
Ability Within Dyad (A)	3	1.77	1.17	3.32*	2.33	1.75	.29	4.54**
Interactions								
XP	6	2.22*	1.15	1.98	.74	3.03**	4.00**	1.49
XA	6	.70	.74	.82	.69	1.14	2.20*	1.75
PA	9	1.65	.40	.56	1.02	1.33	1.69	.98
XPA	18	1.67	.88	.79	1.10	1.16	.82	1.20
S(XPA)	240							
Total	287							

*$p < .05$, $F(2,200) = 3.04$; $F(3,200) = 2.65$; $F(6,200) = 2.14$

**$p < .01$, $F(2,200) = 4.71$; $F(3,200) = 3.88$; $F(6,200) = 2.89$

congruence, and XA ($p<.01$) on intrarole agreement. From the graphs of these means, it was seen that in self-role congruence, boys were more congruent with male roles than female roles. Boys were more congruent with the low-ability role of Mike than with the low-ability role of Anne. Girls did not differ across the levels of P. Teams congruent in sex and ability differed in self-role congruence, boys having higher means than girls. In intrarole agreement, the observed F-value was significant but differences across levels of independent variables were not significant.

Discussion, Conclusions and Recommendations

In sum, in the experiment no treatment effects were found on the dependent variable and unreliable measures of differences on the intervening variable. In the light of these results, the experiment was examined in the following aspects: Sample, design, treatment, dependent variable, and intervening variable.

First, consideration was given to the sample. Bergland and Krumboltz (1969) reported grade eleven to be the optimal level for career exploration. In this study, the sample ($N = 576$) was a representative random selection of the high-ability and low-ability grade eleven population in one city. To the extent that randomly-selected alternates were substituted for absentees of E on treatment day and for C on posttest day, then both E and C would have a selection bias in favor of the Ss who were more regular in school attendance.

Second, consideration was given to the experimental design. In many studies, the power of the experiment to detect differences is low. This experiment had tremendous power. The sample was large. By blocking on two variables, sex and ability, greater power was gained.

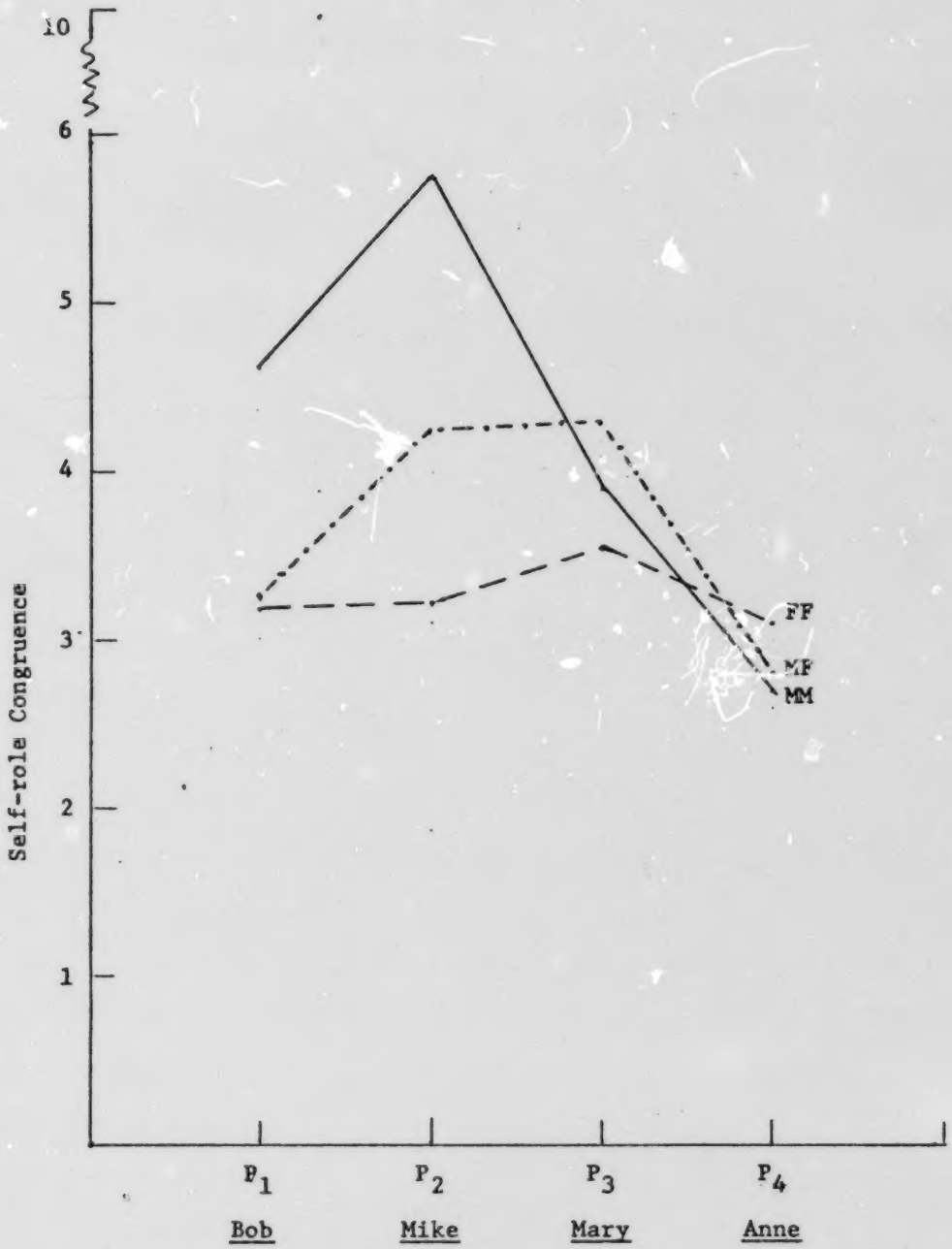

FIGURE 1

INTERACTION EFFECTS OF LEVEL OF INDEPENDENT VARIABLE, SEX OF DYAD, WITH TREATMENT LEVEL, PROFILE PERSON, ON THE SUBTEST, SELF ROLE CONGRUENCE, OF THE INTERVENING VARIABLE, ROLE TAKING

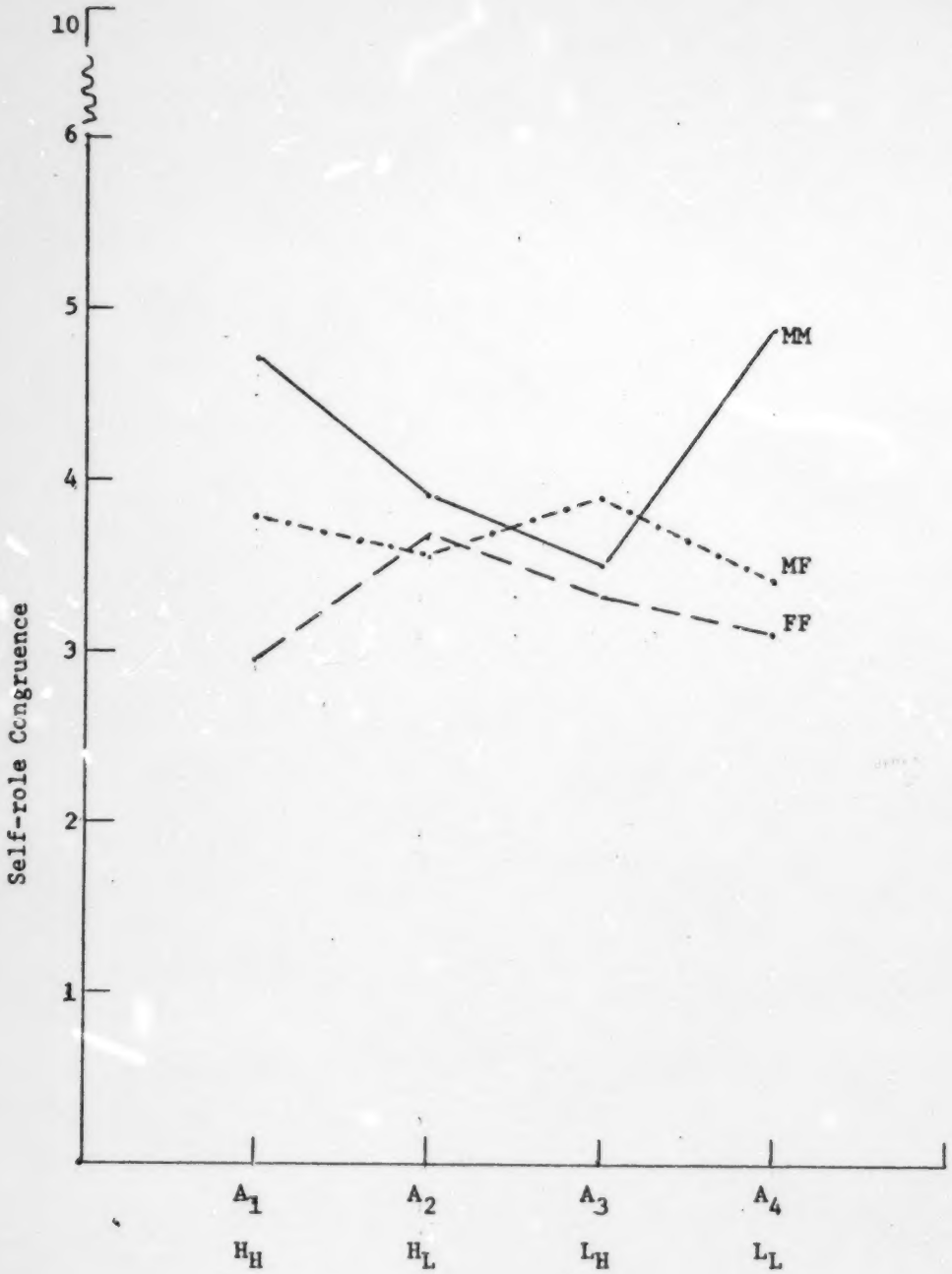

FIGURE 2

INTERACTION EFFECTS OF LEVEL OF INDEPENDENT VARIABLE, ABILITY WITHIN DYAD, WITH LEVELS OF INDEPENDENT VARIABLE, SEX OF DYAD, ON THE SUBTEST, SELF ROLE CONGRUENCE, OF THE INTERVENING VARIABLE, ROLE TAKING

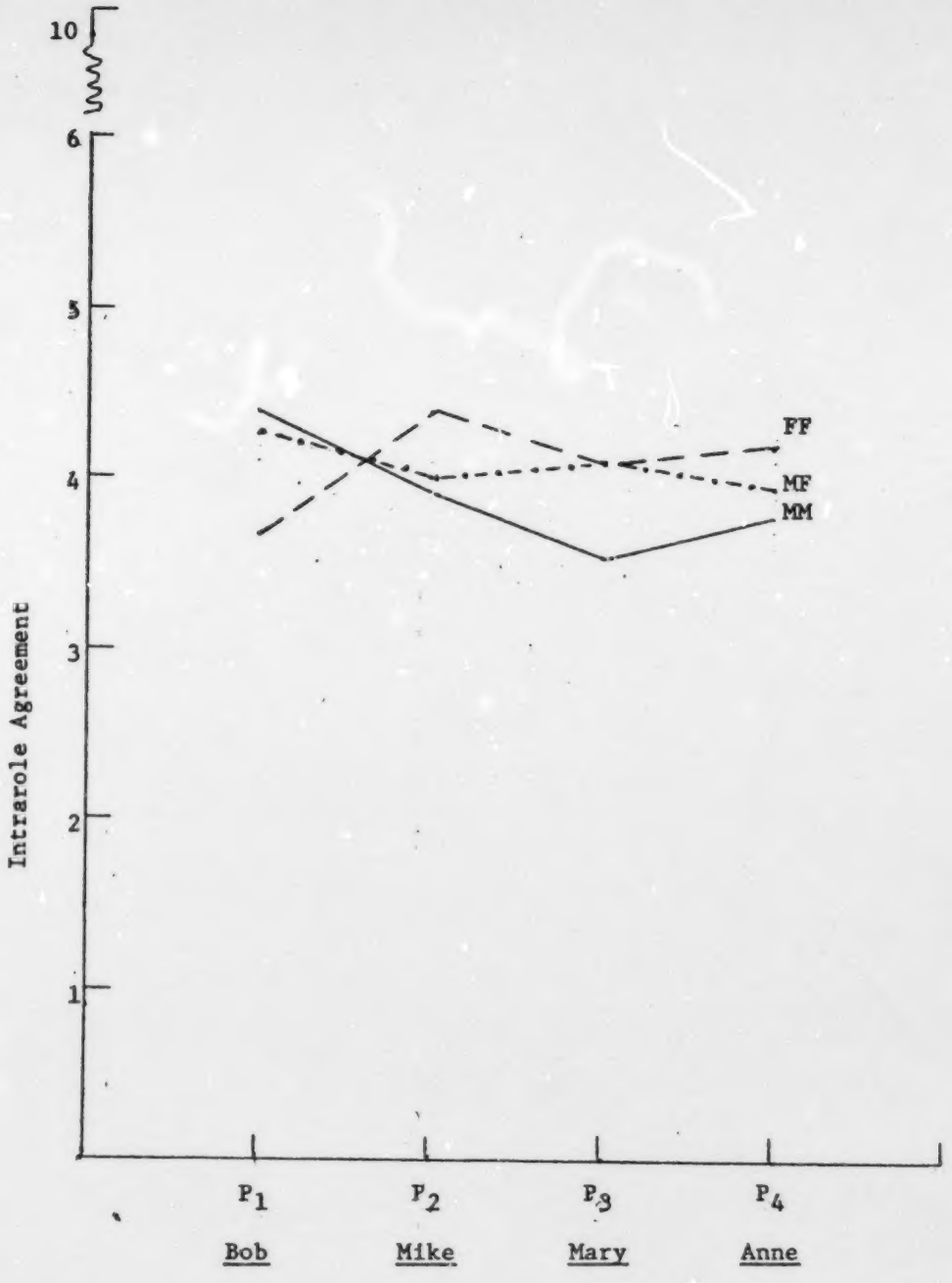

FIGURE 3

INTERACTION EFFECTS OF LEVEL OF INDEPENDENT VARIABLE, SEX OF DYAD, WITH TREATMENT LEVEL, PROFILE PERSON, ON THE SUBTEST, INTRAROLE AGREEMENT, OF THE INTERVENING VARIABLE, ROLE-TAKING

By having all the independent variables completely crossed with equal numbers of Ss in cells and no empty cells, it was possible to use the powerful BMD-08V analysis of variance to test for differences in means of scores. In fact, in the Newman-Keuls test of a pair-wise contrast, it was possible to detect ($p<.01$) a mean difference between E and C of 2.29 on the total test scores of CMI ($MS_e = 113.94$). This amount represented .19 S.D.

Meticulous care was taken to ensure external validity in the experiment. The total grade eleven population was given the posttest to reduce the chance of a Hawthorne effect. Ss were not told of any connection between the treatment and the posttest. Post-testing only was used as a procedure to eliminate pretest sensitization. The treatment schedule had no order effect for school group. To reduce multiple-treatment interference, counselors and scorers gave only general help in finding information or rules, but left the decision-making to the Ss. Scorers were trained for special tasks and the teams of scorer specialists varied each day in members. Game instructions were minimized. Interaction among dyads was not encouraged in order to limit the learnings as much as possible to the effects of the members of the single dyad participating and interacting in the simulation. Random assignment to teams was used to keep dyad differences random except for the controlled variables of sex and ability. Great care was, therefore, taken to ensure that differences apart from treatment were due to chance.

A third explanation might lie in the treatment itself. It was limited to one school day. Given the power of the experiment in design and analysis, it seemed reasonable to expect differences after a four- to five-hour treatment period. Scorers and counselors followed the pro-

cedures and rules of the simulation as it is published. They reported high interest and good involvement in the simulation throughout the day. No students were absent or late for the afternoon session after a full morning in the simulation. The teams worked hard. They appeared to be serious in their responses on SPQ and CDMQ. To the observers, the learning environment was one of enthusiasm for the simulation.

The instrument for the dependent variable was a standardized test designed to measure career maturity. Standardized instruments tend to be broad and general in their sampling of learnings and not to be suitable to detect differences for specific treatments. However, the items of CMI did appear to be related to the kinds of decisions which the Ss were making in the simulation. Moreover, Crites recommended experiments of simulations as a method of improving what he defined as career maturity.

> Similarly, in the field, investigations of the factors which facilitate vocational maturity should be conducted, including counseling, occupational information, role playing, simulation games, programmed instruction, visits to business and industry, etc. (Crites, 1969, p. 88, italics added).

The results of this tudy would not support the hypothesis that a simulation activity in career decision-making facilitates career maturity. If it does, then the instrument is not designed to detect the differences.

For the intervening variable, the instruments had low reliability so that it was impossible to make predictions from the findings. This study neither supports nor denies empirically the hypothesis of an intervening variable. There were several significant F-values for main effects and interactions in the analyses of variance which suggest that investigations to test the hypothesis could be fruitful.

It was concluded that, if the simulation, Life Career, did affect the vocational development of Ss, then the instrument used in this study was not an effective one to detect differences due to treatment.

It was concluded that an R-R theory of intervening variable(s) and dependent variable(s) to assess treatment effects of the process in the simulation, Life Career, should have further investigation.

It was concluded that the major task for the researcher in simulations is one of instrumentation for both dependent and intervening variables.

Recommendations growing out of the present study are made for future research.

1. It is recommended that research in simulations be directed toward investigations based upon theoretical propositions of the learning process in conjunction with dependent variables.

2. It is recommended that research in simulations be directed toward the development of instruments designed to measure both dependent and intervening variables.

3. It is recommended that further research be undertaken to examine the construct, role-taking, as an operational definition of the process in a simulation activity. This construct enables the researcher to test the conflicting theories about the desirable conditions for learning: Congruence of the role theorists and equilibration of the Piagetian model.

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APPENDIX A

SUCCESSFUL PLANNING QUESTIONNAIRE

NAME _____ Sex: M ☐ F ☐

Profile person you play: Anne ☐ Bob ☐ Mary ☐ Mike ☐

(If there are mistakes in the information above, please write the corrections below)

Name _____ Sex: M ☐ F ☐

Profile person: Anne ☐ Bob ☐ Mary ☐ Mike ☐

PLANNING A SUCCESSFUL LIFE CAREER

At the end of each round of the game, please rate how you feel about the plans which you made for your profile person. You may not agree with your team partner about this. That does not matter. What is important is that you mark how YOU FEEL about the way your plans turned out for each round. Please mark with an X the space below which best describes how you feel about the round which you have just finished playing.

	Very Successful	Successful	Neither Successful nor Unsuccessful	Unsuccessful	Very Unsuccessful
Round 1	____	____	____	____	____
Round 2	____	____	____	____	____
Round 3	____	____	____	____	____
Round 4	____	____	____	____	____
Round 5	____	____	____	____	____
Round 6	____	____	____	____	____

Thank you for completing the questions

CAREER DECISION-MAKING QUESTIONNAIRE

CAREER DECISION-MAKING QUESTIONNAIRE

Schools are interested in helping students to learn about making good decisions in planning their careers. Life Ca er, which you have just played, was designed to help you to learn how to make wise career choices.

It is important to know if playing Life Career really does help. This questionnaire has been prepared so that you can tell about your experience in playing Life Career. Your answers will be treated in strictest confidence. There are no right or wrong answers. What is most important is that each answer tells accurately how you felt. Please be careful to answer every question.

Thank you for your co-operation.

CAREER DECISION-MAKING QUESTIONNAIRE

YOUR NAME (Print) _____ SEX M ☐ F ☐
Last First Middle

PROFILE PERSON YOU PLAYED: Anne ☐ Bob ☐ Mary ☐ Mike ☐

FOR EACH OF THE QUESTIONS BELOW, PLEASE CIRCLE THE NUMBER WHICH BEST DESCRIBES YOU WHILE YOU WERE PLANNING THE LIFE CAREER OF YOUR PROFILE PERSON

		Very much				Very little
1.	How much experience have you had in playing simulation or role-taking games in your school classes?	5	4	3	2	1
2.	How much involved did you feel in planning the life career of your profile person ?	5	4	3	2	1
3.	What amount of playing time were you really involved in planning the life career of your profile person?	5	4	3	2	1
4.	How well did you know your team partner before playing Life Career?	5	4	3	2	1
5.	How much did your team partner help you to be interested in planning the life career of your profile person?	5	4	3	2	1
6.	How much did your team partner spoil your interest in planning the life career of your profile person?	5	4	3	2	1
7.	How much did you agree with your team partner about the career plans you made together?	5	4	3	2	1
8.	How much of the time did you get your way in the decisions about career plans?	5	4	3	2	1
9.	From the description on the role cards, how clearly were you able to figure out what your profile person was like?	5	4	3	2	1
10.	What other information would you have liked to know about your profile person that was not on the card?	_____				

Please turn to the next page and answer the questions there.

11. From the description on the profile card, in which of the following ways were you and your profile person alike or different. (Check ONE for each row.)

Sex	☐ Alike	☐ Different
Ability to learn	☐ Alike	☐ Different
Socio-economic status	☐ Alike	☐ Different
Happiness at home	☐ Alike	☐ Different
Career ambitions	☐ Alike	☐ Different
Attitude toward school	☐ Alike	☐ Different
Educational plans	☐ Alike	☐ Different
Hobbies and fun	☐ Alike	☐ Different
Part-time job	☐ Alike	☐ Different
Having friends	☐ Alike	☐ Different

12. During the game of Life Career, we would like to know if you were able to take the part of your profile person and plan as if you were the person. Please tell us whether you felt that your were able to take the part of the person in each of the following areas. (Check ONE for each row.)

Sex	☐ Yes	☐ No
Ability to learn	☐ Yes	☐ No
Socio-economic status	☐ Yes	☐ No
Happiness at home	☐ Yes	☐ No
Career ambitions	☐ Yes	☐ No
Attitude toward school	☐ Yes	☐ No
Educational plans	☐ Yes	☐ No
Hobbies and fun	☐ Yes	☐ No
Part-time job	☐ Yes	☐ No
Having friends	☐ Yes	☐ No

Please turn to the next page and answer the question there.

	Very helpful				Not at all helpful
13. How helpful do you think planning in the Life Career game is for making your own career plans?	5	4	3	2	1

14. High school students have listed ways for them to find out about making good career choices. Please rank the following from 1 to 5, giving number 1 to what you consider to be the BEST and number 5 to the LEAST helpful way to plan your career.

_____ Talk to the counsellor at school.

_____ Read pamphlets about various occupations.

_____ Talk to parents.

_____ Play Life Career.

_____ Talk to people who have jobs you are interested in.

Please check to see that you have answered ALL the questions. THIS IS VERY IMPORTANT. Make sure that you have marked your choice in every question and that you have not omitted any part of a question.

THANK YOU FOR YOUR COOPERATION